VALUE ENGINEERING STUDY
OF
IM-NH-285-1(354)
PI NUMBER: 713290

ATLANTA, GEORGIA
November 17-19, 2003

Prepared by:
Ventry Engineering, L.L.C.

In Association With:

Georgia Department of Transportation

VALUE ENGINEERING STUDY
TEAM LEADER

William F. Ventry, P.E., C.V.S.
C.V.S. Registration No. 840603(LIFE)

Date: _____

TABLE OF CONTENTS

TABLE OF CONTENTS

I. EXECUTIVE SUMMARY

INTRODUCTION

This Value Engineering report summarizes the results of the Value Engineering study performed by Ventry Engineering for the Georgia Department of Transportation. The study was performed during the week of November 17-19, 2003.

PROJECT DESCRIPTION

The project is for the reconstruction of the I-285 and Flat Shoals Road interchange. The project includes the widening of Flat Shoals Road to six lanes and includes the construction of a new bridge over I-285. Also included is widening of Panthersville Road (including a new bridge over I-285) as well as the widening of the I-285 Bridge over Shoal Creek. Retaining walls at the eastbound and westbound exit and entrance ramps, and retaining walls at the bridge abutments are also proposed.

METHODOLOGY

The Value Engineering Team followed the basic Value Engineering procedure for conducting this type of analysis.

This process included the following phases:

1. Investigation
2. Speculation
3. Evaluation
4. Development
5. Report Preparation

Evaluation criteria identified as a basis for the comparison of alternatives included the following:

- Construction Time
- Constructability
- Traffic Control
- Construction Cost
- Future Maintenance Cost
- Vertical and Horizontal Requirements
- Traffic Capacity

RESULTS

The following areas of focus were analyzed by the Value Engineering team and from these areas the following Value Engineering alternatives were developed and are recommended for Implementation:

1- FLAT SHOALS ROAD BRIDGE

The Value Engineering Team recommends that Value Engineering Alternative No. 2, Option "B" be implemented. This alternative reduces the typical section on the bridge by eliminating both outside lanes on the bridge between the ramp terminals and uses bulb T beams.

If this recommendation can be implemented, there is a possible savings of **$ 2,291,317.**

If this recommendation cannot be implemented, then the Value Engineering Team recommends that Value Engineering Alternative No. 1 be implemented. This alternative eliminates the steel plate girders and uses concrete bulb T beams.

If this recommendation can be implemented, there is a possible savings of **$ 1,940,733.**

2- PANTHERSVILLE ROAD BRIDGE

The Value Engineering Team recommends that Value Engineering Alternative No. 1 be Implemented. This alternative
uses a two span concrete bulb T beam bridge rather than a four span bulb T beam bridge.

If this recommendation can be implemented, there is a possible savings of **$ 2,798,667.**

3- SHOAL CREEK BRIDGE WIDENING

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative eliminates the widening of the bridge on both sides of I-285.

If this recommendation can be implemented, there is a possible savings of **$ 963,635.**

4- RETAINING WALLS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative uses small block pre-cast walls for both the cut and fill Walls.

If this recommendation can be implemented, there is a possible savings of **$ 1,855,047.**

5- INTERCHANGE RAMP PAVEMENT

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative uses asphalt pavement on the ramps rather than concrete.

If this recommendation can be implemented, there is a possible savings of **$ 1,698,261.**

6- INTERCHANGE CONFIGURATION

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative uses a single point urban interchange rather than a diamond interchange.

If this recommendation can be implemented, there is a possible savings of **$ 736,684.**

II. LOCATION OF PROJECT

MAP

III. TEAM MEMBERS AND PROJECT DESCRIPTION

TEAM MEMBERS

NAME	AFFILIATION	EXPERTISE	PHONE
Bill Ventry	Ventry Engineering	Team Leader	850/627-3900
Tom Hartley	Ventry Engineering	Design	850/627-3900
John Ledbetter	Ventry Engineering	Structures	850/627-3900
Bruce Nicholson	Ventry Engineering	Construction	850/627-3900
David Henry	LPA Group Inc.	Design	770/263-9118

PROJECT DESCRIPTION

The project is for the reconstruction of the I-285 and Flat Shoals Road interchange in Dekalb County. The project scope includes widening Flat Shoals Road to six lanes with a raised median plus applicable turn lanes and includes construction of a new bridge over I-285. Also included is widening and reconstruction of the ramps and widening of Panthersville Road (including a new bridge over I-285) from Flat Shoals Road to Clifton Springs Road. The following structures are involved and/or proposed: Flat Shoals Road Bridge over I-285, I-285 Bridge over Shoal Creek, Panthersville Road Bridge over I-285, retaining walls at the eastbound and westbound exit and entrance ramps, and retaining walls at the bridge abutments.

IV. INVESTIGATION PHASE

IM-NH-285-1(354)
VALUE ENGINEERING STUDY BRIEFING
November 17, 2003

NAME	DOT OFFICE OR COMPANY	PHONE
Bill Ventry	Ventry Engineering	850/627-3900
Tom Hartley	Ventry Engineering	850-627-3900
John Ledbetter	Ventry Engineering	850-627-3900
Bruce Nicholson	Ventry Engineering	850-627-3900
Joe Wheeler	GA DOT	404-657-9759
Randy Hart	GA DOT	404-656-5306
Thomas Fambro	GA DOT	404-635-8159
Jerry Milligan	GA DOT	404-463-2575
Lisa Myers	GA DOT	404-651-7468
Christa Wilkinson	GA DOT	404-699-4439
Persephone Goodwin	GA DOT	404-299-4386
Tajsha LaShore	GA DOT	404-699-4439
Lyn Clements	GA DOT	404-656-5289
Madelene White	GA DOT	404-699-4431
David Henry	LPA Group Inc	770-263-9118
Jim Kennerly	LPA Group Inc	770-263-9118
George Bradfield	GA DOT	404-656-6849

STUDY RESOURCES

NAME	AFFILIATION	PHONE
Jim Kennerly	LPA Group Inc	770-263-9118
Lyn Clements	GA DOT	404-656-5289
Jerry Milligan	GA DOT	404-463-2575
George Bradfield	GA DOT	404-656-6849
Lisa Myers	GA DOT	404-651-7468
Jeff Sizemore	SCDOT, Bridge	803-737-1420
Al Bowman	LPA Group Inc	770-263-9118
Jennifer Cargill	Tensar	800-292-4459
Joe Bailey	Tensar	404-214-5326

FUNCTIONAL ANALYSIS WORKSHEET, INVESTIGATION PHASE
PROJECT: IM-NH-285-1(354)
DATE: November 17, 2003

ITEM	FUNCT. VERB	FUNCT. NOUN	* TYPE	COST	WORTH	VALUE INDEX
Flat Shoals Rd Bridge	Span	I-285	B	$ 5,000,000	$ 3,400,000	1.5
Panthersville Road Bridge	Span	I-285	B	$ 2,300,000	$ 1,700,000	1.4
Shoal Creek Bridge Widening	Accommodate	Ramps	S	$ 500,000	$ 0	∞
Retaining Walls	Retain	Material	B	$ 6,000,000	$ 5,000,000	1.2
Asphalt Pavement	Support	Vehicles	B	$ 2,500,000	$ 2,000,000	1.3
Concrete Pavement	Support	Vehicles	B	$ 1,500,000	$ 750,000	2.0
Earthwork	Widen	Roadway	S	$ 1,000,000	$ 1,000,000	1.0
Drainage	Convey	Water	B	$ 400,000	$ 400,000	1.0
Right of Way	Obtain	Material	B	$ 7,100,000	$ 6,000,000	1.2

***B – Basic S - Secondary**

** Note: This worksheet is a tool of the Value Engineering process and is only used for determining the areas that the Value Engineering team should focus on for possible alternatives. The column for COST indicates the approximate amount of the cost as shown in the cost estimate. The column for WORTH is an estimated cost for the lowest possible alternative that would provide the FUNCTION shown. Many times the lowest cost alternatives are not considered implementable but are used only to establish a worth for a function. A value index greater than 1.00 indicates the Value Engineering team intends to focus on this area of the project.

INVESTIGATION

The following areas have a value index greater than 1.00 on the proceeding Functional Analysis Worksheet and therefore have been identified by the Value Engineering Team as areas of focus and investigation for the Value Engineering process:

A. FLAT SHOALS ROAD BRIDGE

B. PANTHERSVILLE ROAD BRIDGE

C. SHOAL CREEK BRIDGE WIDENING

D. RETAINING WALLS

E. INTERCHANGE RAMP PAVEMENT

F. INTERCHANGE CONFIGURATION

V. SPECULATION PHASE

SPECULATION

Ideas generated, utilizing the brainstorming method, for performing the functions of previously identified areas of focus.

A. FLAT SHOALS ROAD BRIDGE

- Eliminate steel plate girder and use concrete bulb T beams
- Eliminate the outside southbound lane on bridge between the westbound and eastbound ramp terminals
- Reduce the typical section on the bridge by eliminating both outside lanes on the bridge between the ramp terminals
- Eliminate the bike lanes on Flat Shoals Road and use the bike lanes on Clifton Springs and Panthersville Roads

B. PANTHERSVILLE ROAD BRIDGE

- Four lane typical section with bike lane and sidewalk
- Reduce the five lane typical section on the roadway and bridge by reducing the width of the bike lane and sidewalk
- Use a two span concrete bulb T beam bridge

C. SHOAL CREEK BRIDGE WIDENING

- Eliminate the widening on both sides of I-285
- Eliminate the widening on the eastbound "ENTRANCE" ramp side only
- Eliminate the widening on the westbound "EXIT" ramp side only

D. RETAINING WALLS

- Use top down construction of soil nail walls on the cut walls
- Use small block pre-cast walls for the fill walls
- Use small block pre-cast walls for both the cut and fill walls

E. INTERCHANGE RAMP PAVEMENT

- Use asphalt pavement on the ramps rather than concrete

F. INTERCHANGE CONFIGURATION

- Use a single point urban interchange
- Use a split diamond interchange
- Use a dog-bone or dumb-bell type interchange

VI. EVALUATION PHASE

VI.(A) ALTERNATIVES

ALTERNATIVES

The following alternatives were formulated during the "eliminate and combine" portion of the Evaluation Phase.

A. FLAT SHOALS ROAD BRIDGE
Value Engineering Alternative Number 1 - Eliminate steel plate girder and use concrete bulb T beams

Value Engineering Alternative Number 2 - Reduce the typical section on the bridge by eliminating both outside lanes on the bridge between the ramp terminals

B. PANTHERSVILLE ROAD BRIDGE
Value Engineering Alternative Number 1 - Use a two span concrete bulb T beam bridge

Value Engineering Alternative Number 2 - Reduce the five lane typical section on the roadway and bridge by reducing the width of the bike lane and sidewalk

C. SHOAL CREEK BRIDGE WIDENING
Value Engineering Alternative - Eliminate the widening on both sides of I-285

D. RETAINING WALLS
Value Engineering Alternative - Use small block pre-cast walls for both the cut and fill walls

E. INTERCHANGE RAMP PAVEMENT
Value Engineering Alternative - Use asphalt pavement on the ramps rather than concrete

F. INTERCHANGE CONFIGURATION
Value Engineering Alternative - Use a single point urban interchange

VI.(B) ADVANTAGES AND DISADVANTAGES

EVALUATION

The following Advantages and Disadvantages were developed for the Value Engineering Alternatives previously generated during the speculation phase. It also includes the Advantages and Disadvantages for the As Proposed.

A. FLAT SHOALS ROAD BRIDGE

"As Proposed" – Two span continuous steel plate girder with vertical abutments and MSE walls

Advantages

- Provides horizontal clearance for future I-285 typical section
- Provides for required vertical clearance over I-285
- Slight increase in capacity on bridge
- Provides additional width for construction traffic control
- Provides for bike lane and sidewalk

Disadvantages

- Higher maintenance of steel bridge
- Longer construction time
- High construction cost

Conclusion

Carry forward for further evaluation

Value Engineering Alternative Number 1 - Eliminate steel plate girder and use concrete bulb T beams

Advantages

- Lower construction cost
- Less construction time
- Lower maintenance cost because concrete bridge maintenance is less than steel

Disadvantages

- None apparent

Conclusion

Carry forward for further evaluation

Value Engineering Alternative Number 2 - Reduce the typical section on the bridge by eliminating both outside lanes on the bridge between the ramp terminals

Advantages

- Lower construction cost
- Less construction time
- Less future maintenance because less bridge area

Disadvantages

- Requires wider receiving lanes for turning movements
- May require additional signing

Conclusion

Carry forward for further evaluation

B. PANTHERSVILLE ROAD BRIDGE

"As Proposed" – Four span concrete bulb T girder bridge
Advantages
- Provides horizontal clearance for future I-285 typical section
- Provides for required vertical clearance over I-285
- Increase in capacity on bridge
- Provides additional width for construction traffic control
- Provides for bike lane and sidewalk

Disadvantages
- Two additional piers on I-285
- High construction cost

Conclusion
Carry forward for further evaluation

Value Engineering Alternative Number 1 - Use a two span concrete bulb T beam bridge
Advantages
- Less piers on I-285
- Less maintenance because less bridge area
- Less construction cost
- Less construction time
- Provides horizontal clearance for future I-285 typical section
- Provides for required vertical clearance over I-285

Disadvantages
- Requires deeper beams

Conclusion
Carry forward for further evaluation

Value Engineering Alternative Number 2 - Reduce the five lane typical section on the roadway and bridge by reducing the width of the bike lane and sidewalk
Advantages
- Less maintenance because less bridge area
- Less roadway and bridge construction cost
- Less construction time
- Provides horizontal clearance for future I-285 typical section
- Provides for required vertical clearance over I-285
- Less right of way
- Same bike lane and sidewalk typical section as Flat Shoals Road

Disadvantages
- None Apparent

Conclusion
Carry forward for further evaluation

C. SHOAL CREEK BRIDGE WIDENING

"As Proposed" – Widen the existing three span bridge on each side to accommodate the extended "entrance" and "exit" ramps

Advantages

- Would allow for desirable "entrance" and "exit" ramp lengths

Disadvantages

- Higher construction cost
- Traffic control on I-285
- Longer construction time

Conclusion

Carry forward for further evaluation

Value Engineering Alternative - Eliminate the widening on both sides of I-285

Advantages

- Lower construction cost
- Less traffic control on I-285
- Less construction time

Disadvantages

- None apparent

Conclusion

Carry forward for further evaluation

D. RETAINING WALLS

"As Proposed" – MSE walls used in both cut and fill areas

Advantages

- Typical construction technique

Disadvantages

- Additional excavation and shoring required for MSE walls in the cut areas
- Longer construction time in cut walls

Conclusion

Carry forward for further evaluation

Value Engineering Alternative-Use small block pre-cast walls for both the cut and fill walls

Advantages

- No potential for corrosion of straps
- Less construction cost
- Easier construction
- More aesthetically pleasing than the large MSE panels

Disadvantages

- None apparent

Conclusion

Carry forward for further evaluation

E. INTERCHANGE RAMP PAVEMENT

"As Proposed" – Concrete pavement
Advantages
- Longer service life
- Less frequency of maintenance

Disadvantages
- Higher construction cost
- Higher traffic control during construction
- Longer construction time
- Does not match the asphalt pavement on I –285 or the two crossroads

Conclusion
Carry forward for further evaluation

Value Engineering Alternative - Use asphalt pavement on the ramps rather than concrete
Advantages
- Less construction cost
- Lower traffic control during construction
- Shorter construction time
- Matches the asphalt pavement on I –285 and the two crossroads

Disadvantages
- None apparent

Conclusion
Carry forward for further evaluation

F. INTERCHANGE CONFIGURATION

"As Proposed" – Reconstructed Diamond Interchange
Advantages
- Typical interchange
- Good driver expectancy

Disadvantages
- May be lower capacity than SPUI
- Tight truck turning radius

Conclusion
Carry forward for further evaluation

Value Engineering Alternative – Single Point Urban Interchange
Advantages
- May be better capacity
- Larger turning radius
- May be less construction cost
- May be less right of way impacts

Disadvantages
- Driver expectancy

Conclusion
Carry forward for further evaluation

VII. DEVELOPMENT PHASE

VII.(A) FLAT SHOALS ROAD BRIDGE

VII.(A)(1) AS PROPOSED

"As Proposed"

The Bridge on Flat Shoals Road over I-285 is currently proposed as a 2 span continuous plate girder structure 155 feet wide by 311 feet in length. The typical section includes 3-through lanes in each direction, right turn lane for each ramp, and dual left turns to the entrance ramps.

Insert 1

VII.(A)(2) VALUE ENGINEERING ALTERNATIVE NUMBER 1

Value Engineering Alternative Number 1

This Value Engineering Alternate consists of 2 spans with bulb tee beams continuous under live load in-lieu of continuous plate girders. The width of the structure will remain at 155 feet and the length will remain at 311 feet.

Insert 1

VALUE ENGINEERING ALTERNATIVE NUMBER 1
"A" FLAT SHOALS ROAD BRIDGE
COST COMPARISON

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Plate Girders	SF	$100.00	48205	$4,820,500		$0
Bulb Tee Beams	SF	$70.00		$0	48205	$3,374,350
SUBTOTAL				**$4,820,500**		**$3,374,350**
Inflation (5%, 4yrs)				$1,060,510		$742,357
SUBTOTAL				**$5,881,010**		**$4,116,707**
E&C (10%)				$588,101		$411,671
GRAND TOTAL				**$6,469,111**		**$4,528,378**

POSSIBLE SAVINGS $1,940,733

VII.(A)(3) VALUE ENGINEERING ALTERNATIVE NUMBER 2, OPTION A

Value Engineering Alternative Number 2, Option A

This Value Engineering Alternate consists of eliminating the outside lanes on the bridge between ramp terminals. The bridge will consist of continuous steel plate girder spans. The recommended structure will be of sufficient width to accommodate traffic under stage construction.

The intersecting skew of the roadways creates turning movement problems, especially with the high volume of trucks that use this interchange. Therefore, in developing this alternative, only half the outside lane on each side of the bridge was eliminated, reducing the through lane width from 3 lanes at 36' to 2 lanes at 30'. This allows the dual left movement from the exit ramps to turn into extra-width lanes. The overall reduction of 12' in the width of the bridge resulted in substantial savings. If it is determined that vehicles, including trucks, can turn into 2- 12' through lanes with the additional width of the bike path and dual left turns, then the savings could double.

Insert 1

VALUE ENGINEERING ALTERNATIVE NUMBER 2, OPTION A
"A' FLAT SHOALS ROAD BRIDGE
COST COMPARISON

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
155 Ft Wide Typ Section On Plate Girders	SF	$100.00	48205.0	$4,820,500		$0
Reduce Typ Section To 143 Ft By Eliminating Both Outside Lanes On Plate Girders	SF	$100.00			44473.0	$4,447,300
SUBTOTAL				**$4,820,500**		**$4,447,300**
Inflation (5%, 4yrs)			0.0	$1,060,510		$978,406
SUBTOTAL				**$5,881,010**		**$5,425,706**
E&C (10%)				$588,101		$542,571
				$0		$0
				$0		$0
GRAND TOTAL				**$6,469,111**		**$5,968,277**

POSSIBLE SAVINGS $500,834

VII.(A)(4) VALUE ENGINEERING ALTERNATIVE NUMBER 2, OPTION B

Value Engineering Alternative Number 2, Option B

This Value Engineering Alternate consists of eliminating the outside lanes on the bridge between ramp terminals. The bridge will consist of continuous for live load bulb tee beam spans. The recommended structure will be of sufficient width to accommodate traffic under stage construction.

As previously mentioned, the intersecting skew of the roadways creates turning movement problems, especially with the high volume of trucks that use this interchange. Therefore, in developing this alternative, only half a lane on each side of the bridge was eliminated, reducing the through lane width from 3 lanes at 36' to 2-lanes 30'. This allows the dual left movement from the exit ramps to turn into extra-width lanes. This overall reduction of 12' in the width of the bridge resulted in substantial savings. If it is determined that vehicles, including trucks, can turn into 2-12' through lanes with the additional width of the bike path and dual left turns, then the savings could double.

Insert 1

VALUE ENGINEERING ALTERNATIVE NUMBER 2, OPTION B
"A" FLAT SHOALS ROAD BRIDGE
COST COMPARISON

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
155 Ft Wide Typ Section On Plate Girders	SF	$100.00	48205	$4,820,500		$0
Reduce Typ Section to 143 FT By Eliminating Both Outside Lanes On Bulb Tees	SF	$70.00		$0	44473	$3,113,110
SUBTOTAL				**$4,820,500**		**3113110**
Inflation (5%, 4yrs)				$1,060,510		$684,884
SUBTOTAL				**$5,881,010**		**$3,797,994**
E&C (10%)				$588,101		$379,799
GRAND TOTAL				**$6,469,111**		**$4,177,794**

POSSIBLE SAVINGS $2,291,317

VII.(B) PANTHERSVILLE ROAD BRIDGE

VII.(B)(1) AS PROPOSED

"As Proposed"

Panthersville Road is an urban minor arterial in the project area from Flat Shoals Road to Clifton Springs Road carrying about 12,000 VPD. This section is approximately 4000' in length. The existing features on Panthersville Road include four 12' travel lanes without a dividing median, variable sections of paved shoulders, some curb and gutter, and intermittent sidewalk. There is a grade separation structure over I-285 on Panthersville Road. This structure will be replaced to provide for future expansion of I-285, to raise it from its current deficient vertical clearance of 15'8" and to provide sufficient horizontal clearance. The projected design year volume for Panthersville Road is an estimated 18,300 VPD.

The "as proposed" roadway typical section consists of four 12' travel lanes separated by a 14' flush median to serve as a two-way left turn lane. The typical section also includes two 7' bike lanes, curb and gutter on each side, and two 6' sidewalks. This typical section width could accommodate a 16' raised median if traffic volumes warranted it in the future

The "as proposed" bridge deck will have the same typical section as described above. The proposed bridge will be a four-span structure using bulb "T" beams. The two exterior spans will be over the entrance / exit ramps from Flat Shoals Road and the two interior spans will be over I-285. The vertical clearance of the new bridge will be 17'6" over I-285.

Insert 1

Insert 2

Insert 3

VII.(B)(2) VALUE ENGINEERING ALTERNATIVE NUMBER 1

Value Engineering Alternative Number 1

An alternative to the "as proposed" concept for Panthersville Road is a change in the design of the bridge over I-285. The recommendation of the Value Engineering Team is to construct the Panthersville Road as a two-span bridge rather than a four-span bridge. Each required span length would then be approximately 150'. This length will accommodate the future widening of I-285. This concept will require the two entrance and the two exit lanes for the Flat Shoals ramps to be immediately parallel to the future mainline of I-285. It should be noted however, that these two ramps would still be more than 40' from the mainline until such time that the widening is accomplished on I-285.

In discussing this proposal with the Department's Bridge Design section, it was determined that there would be only a slight increase in the beam depths so the tie-ins of the approaches will not be significantly affected. By reducing the length of the bridge, there is also less unclassified excavation along I-285 due to the shorter bridge length. Since the intermediate bents between the mainline of I-285 and the ramps would be eliminated, protection of the intermediate bents would also be eliminated. One of the largest cost savings for this alternative is the significant reduction in the amount of retaining walls needed along the ramps. It is estimated that approximately 75% of the retaining wall length would be eliminated on the eastbound exit and the westbound entrance.

Insert 1

Insert 2

Insert 3

Insert 4

VALUE ENGINEERING ALTERNATIVE NUMBER 1
PANTHERSVILLE ROAD BRIDGE
COST COMPARISON

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
FOUR SPAN	SF	$70.00	34362.0	$2,405,340		
TWO SPAN	SF	$70.00		$0	28320.0	$1,982,400
EARTHWORK - UNCLASSIFIED	CY	$5.00	207.0	$1,035		$0
GRADED AGGREGATE BASE	SY	$12.00		$0	500.0	$6,000
ASPHALTIC CONCRETE, 4" SUPERPAVE BASE	TN	$38.00		$0	110.0	$4,180
ASPHALTIC CONCRETE, 2" SUPERPAVE BINDER	TN	$42.00		$0	55.0	$2,310
ASPHALTIC CONCRETE, 1 1/2" SUPERPAVE SURFACE	TN	$42.00		$0	40.0	$1,680
CONCRETE MEDIAN BARRIER	LF	$55.00	400.0	$22,000		$0
RETAINING WALL (ADJACENT TO EB EXIT RAMP)	SF	$45.00	30000.0	$1,350,000	7500.0	$337,500
RETAINING WALL (ADJACENT TO WB ENTRANCE RAMP)	SF	$45.00	19200.0	$864,000	4800.0	$216,000
SUBTOTAL				**$4,642,375**		**$2,550,070**
INFLATION (5YRS, 4 YRS)			21.6%	$1,002,753	21.6%	$550,815
SUBTOTAL				**$5,645,128**		**$3,100,885**
ENGINEERING & CONTINGENCY			10.0%	$564,513	10.0%	$310,089
GRAND TOTAL				**$6,209,641**		**$3,410,974**

POSSIBLE SAVINGS $2,798,667

VII.(B)(3) VALUE ENGINEERING ALTERNATIVE NUMBER 2, OPTION A

Value Engineering Alternative Number 2, Option A

The Value Engineering Team also considered the typical section design of Panthersville Road. In the "as proposed" design, extra wide bike paths on both sides are proposed to only accommodates the future width for the raised median. The design year volumes for Panthersville Road are still below the threshold of 20,000 VPD normally considered as critical for needing a divided roadway section. Further, in the briefing of the project by the Design Team, it was discussed that traffic volumes have recently been adjusted down in the study area. If this phenomenon continues, there may never be a need for the divided median.

Therefore, it was concluded that the "as proposed" width could be modified to a more typical five-lane urban section. This would reduce the bike paths from 7' to 4' and the sidewalk from 6' to 5'. This matches the same widths that are currently proposed on the Flat Shoals Road typical section included in the attachments. This would reduce the overall width by 8 feet. In this value engineering option, the four span bridge as proposed is retained. The right-of-way impact is reduced slightly with approximately 13,000 square feet less commercial and 1800 square feet less from apartments needed.

Insert 1

Insert 2

Insert 3

VALUE ENGINEERING ALTERNATIVE NUMBER 2, OPTION A
PANTHERSVILLE ROAD BRIDGE
COST COMPARISON

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
FOUR SPAN BRIDGE	SF	$70.00	34362.0	$2,405,340	31450.0	$2,201,500
GRADED AGGREGATE BASE	SY	$12.00	28800.0	$345,600	26300.0	$315,600
ASPHALTIC CONCRETE, 4" SUPERPAVE BASE	TN	$38.00	6340.0	$240,920	5790.0	$220,020
ASPHALTIC CONCRETE, 2" SUPERPAVE BINDER	TN	$42.00	3170.0	$133,140	2895.0	$121,590
ASPHALTIC CONCRETE, 1 1/2" SUPERPAVE SURFACE	TN	$42.00	2380.0	$99,960	2170.0	$91,140
SIDEWALK	SY	$23.00	4940.0	$113,620	4110.0	$94,530
SUBTOTAL				**$3,338,580**		**$3,044,380**
INFLATION (5YRS, 4 YRS)			21.6%	$721,133	21.6%	$657,586
SUBTOTAL				**$4,059,713**		**$3,701,966**
ENGINEERING & CONTINGENCY			10.0%	$405,971	10.0%	$370,197
RIGHT-OF-WAY COMMERCIAL	SF	$7.46	12900.0	$96,234		
RIGHT-OF-WAY APARTMENTS	SF	$2.87	1800.0	$5,166		
GRAND TOTAL				**$4,567,085**		**$4,072,163**

POSSIBLE SAVINGS $494,922

VII.(B)(4) VALUE ENGINEERING ALTERNATIVE NUMBER 2, OPTION B

Value Engineering Alternative Number 2, Option B

As previously stated, the Value Engineering Team considered the typical section design of Panthersville Road. In the "as proposed" design, also extra wide bike paths on both sides are proposed only to accommodate the future width for the raised median. The design year volumes for Panthersville Road are still below the threshold of 20,000 VPD normally considered as critical for needing a divided roadway section. Further, in the briefing of the project by the Design Team, it was discussed that traffic volumes have recently been adjusted down in the study area. If this phenomenon continues, there may never be a need for the divided median.

Therefore, it was concluded that the "as proposed" width could be modified to a more typical five-lane urban section. This would reduce the bike paths from 7' to 4' and the sidewalk from 6' to 5'. This matches the widths currently proposed on the Flat Shoals Road typical section. This would reduce the overall width by 8 feet. The impact to the right-of-way will also be slightly reduced by requiring approximately 13000 square feet less commercial and 1800 square feet less from apartments needed.

Further, in considering the first alternative for Panthersville Road, it is recommended that the bridge over I-285 be revised from a 4-span to a 2-span bridge as a part of this option.

Insert 1

Insert 2

Insert 3

Insert 4

Insert 5

VALUE ENGINEERING ALTERNATIVE NUMBER 2, OPTION B
PANTHERSVILLE ROAD BRIDGE
COST COMPARISON

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
FOUR SPAN	SF	$70.00	34362.0	$2,405,340		$0
TWO SPAN	SF	$70.00		$0	28320.0	$1,982,400
EARTHWORK - UNCLASSIFIED	CY	$5.00	207.0	$1,035		$0
GRADED AGGREGATE BASE	SY	$12.00	28800.0	$345,600	26300.0	$315,600
ASPHALTIC CONCRETE, 4" SUPERPAVE BASE	TN	$38.00	6340.0	$240,920	5790.0	$220,020
ASPHALTIC CONCRETE, 2" SUPERPAVE BINDER	TN	$42.00	3170.0	$133,140	2895.0	$121,590
ASPHALTIC CONCRETE, 1 1/2" SUPERPAVE SURFACE	TN	$42.00	2380.0	$99,960	2170.0	$91,140
CONCRETE MEDIAN BARRIER	LF	$55.00	400.0	$22,000		$0
RETAINING WALL (ADJACENT TO EB EXIT RAMP)	SF	$45.00	30000.0	$1,350,000	7500.0	$337,500
RETAINING WALL (ADJACENT TO WB ENTRANCE RAMP)	SF	$45.00	19200.0	$864,000	4800.0	$216,000
SIDEWALK	SY	$23.00	4940.0	$113,620	4110.0	$94,530
SUBTOTAL				**$5,575,615**		**$3,378,780**
INFLATION (5YRS, 4 YRS)			21.6%	$1,204,333	21.6%	$729,816
SUBTOTAL				**$6,779,948**		**$4,108,596**
ENGINEERING & CONTINGENCY			10.0%	$677,995	10.0%	$410,860
RIGHT-OF-WAY COMMERCIAL	SF	$7.46	12900.0	$96,234		
RIGHT-OF-WAY APARTMENTS	SF	$2.87	1800.0	$5,166		
GRAND TOTAL				**$7,559,343**		**$4,519,456**

POSSIBLE SAVINGS $3,039,886

VII.(C) SHOAL CREEK BRIDGE WIDENING

VII.(C)(1) AS PROPOSED

"As Proposed"

The currently proposed length of Ramp "C" (I-285 NB Entrance Ramp) and Ramp "D" (I-285 SB Exit Ramp) requires that the existing 132 – foot wide I-285 bridge over Shoal Creek be widened to 160 feet. Each side will be widened approximately 14'. This bridge was originally twin 202' X 38' bridges that were widened to the median to form the existing 202' X 132' bridge.

Ramp "C", beginning at Flat Shoals Road is a two-lane on-ramp that narrows to a one-lane ramp to enter I-285 NB. The total length from Flat Shoals Road to the end of the taper is 3250' +/-.

Ramp "D", beginning at Flat Shoals Road is a three-lane ramp that narrows to one-lane. The total length from Flat Shoals Road to the end of the taper is 3400' +/-.

Insert 1

Insert 2

VII.(C)(2) VALUE ENGINEERING ALTERNATIVE

Value Engineering Alternative

The Value Engineering Team recommends shortening the ramps to eliminate the need for widening the I-285/Shoal Creek Bridge. Ramp "C" can be shortened to 2160' +/- and Ramp "D" can be shortened to 2015' +/-.

Ramp "C"

According to the "A Policy On Geometric Design of Highways and Streets" Exhibit 10-70, the necessary acceleration length for a vehicle turning onto the ramp (assumed speed 15 MPH) to accelerate to a Design Speed of 70 MPH is **1560'**. It also states the a uniform taper rate of 50:1 to 70:1 should be used which would require a minimum of 1200', which 600' would be within the acceleration length. This yields a **2160'** Ramp "C" length, which puts the end of the taper at the beginning of the Shoal Creek Bridge, therefore, not requiring the bridge to be widened.

Ramp "D"

According to the "A Policy On Geometric Design of Highways and Streets" Exhibit 10-73, the necessary deceleration length for a vehicle exiting onto the ramp (Design Speed of 70 MPH) to decelerate to a stopped condition is **615'**. The taper length is the same, 1200'. Since this is an exit ramp to a stopped condition, additional length needs to be added to account for vehicles in the que waiting for the light to change. The 2026 Design Hour Traffic Volumes for this ramp indicates a PM Peak of 1426 vehicles in the Design Hour. These vehicles would be spread over three lanes and with an assumed 30 signal cycles/hour would yield a que of approximately 16 vehicles/lane or an additional 400' for storage. Therefore, this ramps length could be reduced to 2015'. The taper could begin approximately 350' west of the end of the Shoal Creek Bridge, which, also would not require the bridge to be widened.

Insert 1

VALUE ENGINEERING ALTERNATIVE
SHOAL CREEK BRIDGE
COST COMPARISON

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
WIDEN EXISTING BRIDGE	SF	$70.00	5656.0	$395,920	0.0	$0
RAMP PAVEMENT	SY	$51.00	31000.0	$1,581,000	24400.0	$1,244,400
SUBTOTAL				**$1,976,920**		**$1,244,400**
INFLATION (5%, 4YRS)			21.6%	$426,039	21.6%	$268,176
SUBTOTAL				**$2,402,959**		**$1,512,576**
E&C			10.0%	$197,692	10.0%	$124,440
GRAND TOTAL (2007)				**$2,600,651**		**$1,637,016**

POSSIBLE SAVINGS $963,635

VII.(D) RETAINING WALLS

VII.(D)(1) AS PROPOSED

"As Proposed"

The current plans show the retaining walls to be MSE with panel facing elements. This type of wall is used both in fill and cut sections. The walls are located along all exit and entrance ramps for the Flat Shoals road interchange.

Insert 1

VII.(D)(2) VALUE ENGINEERING ALTERNATIVE

Value Engineering Alternative

The Value Engineering Alternative is to use Small Block MSE Walls with Geogrid reinforcement. This alternate is to be a direct substitution for the proposed wall type in both cut and fill sections.

Insert 1

VALUE ENGINEERING ALTERNATIVE

"D" RETAINING WALLS
COST COMPARISON

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
Ramp A MSE Walls	SF	$45.00	29550	$1,329,750		$0
Ramp A Small Block MSE Walls	SF	$22.00		$0	29550	$650,100
Ramp B MSE Walls	SF	$45.00	12250	$551,250		$0
Ramp B Small Block MSE Walls	SF	$22.00		$0	12250	$269,500
Ramp C MSE Walls	SF	$45.00	8850	$398,250		$0
Ramp C Small Block MSE Walls	SF	$22.00		$0	8,850	$194,700
Ramp D MSE Walls	SF	$45.00	9,450	$425,250		$0
Ramp D Small Block MSE Walls	SF	$22.00		$0	9,450	$207,900
SUBTOTAL				**$2,704,500**		**$1,322,200**
Inflation@ 5%, 4 yrs				$594,990		$290,884
SUBTOTAL				**$3,299,490**		**$1,613,084**
E&C (10%)				$329,949		$161,308
GRAND TOTAL				**$3,629,439**		**$1,774,392**

POSSIBLE SAVINGS
$1,855,047

VII.(E) INTERCHANGE RAMP PAVEMENT

VII.(E)(1) AS PROPOSED

"As Proposed"

The proposed project will reconstruct the exit and entrance ramps from I-285 to Flat Shoals road. The ramps as currently proposed will include the use of concrete pavement from the gore areas to the edge of pavement line on Flat Shoals Road.

The advantages and disadvantages of using concrete paving on the ramps was discussed in the evaluation phase. But it needs to be reiterated here that the staging of construction and the impact to traffic is significant when using concrete pavement.

Insert 1

VII.(E)(2) VALUE ENGINEERING ALTERNATIVE

Value Engineering Alternative

The value engineering team recommends the use of conventional asphalt paving on the ramps in lieu of the proposed concrete pavement. By using asphalt paving, this means that the same type of paving will be used throughout the project and will improve the staging, traffic impacts, and time of construction.

A life cycle cost analysis was performed in comparing the concrete paving with the asphalt paving. Some of the criteria used included a 40-year life of concrete, a 4% discount rate, resurfacing the asphalt every 13 years, etc as shown on the a following chart. The potential life cycle cost savings of using asphalt over concrete was $793,689.

Insert 1

VALUE ENGINEERING ALTERNATIVE
INTERCHANGE RAMP PAVING
COST COMPARISON

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
GRADED AGGREGATE BASE - 12"	SY	$12.00	31000.0	$372,000	31000.0	$372,000
PORTAND CEMENT CONCRETE - 10"	SY	$51.00	31000.0	$1,581,000	0.0	$0
ASPHALT CONCRETE, 4" SUPERPAVE BASE	TN	$38.00		$0	6820.0	$259,160
ASPHALT CONCRETE, 3" SUPERPAVE BASE	TN	$38.00	5115.0	$194,370		$0
ASPHALT CONCRETE, 2" SUPERPAVE BINDER	TN	$42.00		$0	3410.0	$143,220
ASPHALT CONCRETE, 1 1/2" SUPERPAVE SURFACE	TN	$42.00		$0	2560.0	$107,520
SUBTOTAL				**$2,147,370**		**$881,900**
INFLATION (5%, 4YRS)				$472,421	0.0%	$194,018
SUBTOTAL				**$2,619,791**	**0.0%**	**$1,075,918**
E & C			10.0%	$261,979	10.0%	$107,592
GRAND TOTAL				**$2,881,771**	**0.0%**	**$1,183,510**

POSSIBLE SAVINGS $1,698,261

Insert 1

VII.(F) INTERCHANGE CONFIGURATION

VII.(F)(1) AS PROPOSED

"As Proposed"

The I-285/Flat Shoals Road Interchange is currently designed as a Tight Diamond Interchange as shown on the following sheet. The configuration includes 3-through lanes in each direction, right turn lane for each entrance ramp, and dual left turns to the entrance ramps. The exit ramps will be signalized with dual left and right turn lanes.

The structure for the overpass will be a two span steel plate structure. Each span will accommodate the future widening of I-285 to its ultimate typical of a barrier separated HOV Lane and 5 through lanes in each direction. The structure is skewed 58 ° +/-, which pushes the bridge length to 310' +/-. The width of the structure will be 155' +/-.

HSC2000 software used to evaluate each of the signals at the ramp terminals, which indicates the two signals, will be operating "Over Capacity" for the 2026 Peak Hour Traffic Volumes (revised August 2003). This "Over Capacity" will also be exacerbated by the high truck volumes anticipated at this interchange.

Insert 1

Insert 2

Insert 3

Insert 4

Insert 5

Insert 6

Insert 7

Insert 8

Insert 9

Insert 10

Insert 11

Insert 12

Insert 13

Insert 14

Insert 15

Insert 16

Insert 17

Insert 18

Insert 19

Insert 2 0

Insert 21

Insert 22

Insert 23

VII.(F)(2) VALUE ENGINEERING ALTERNATIVE

Value Engineering Alternative

The Value Engineering Team recommends constructing a Single Point Urban Interchange (SPUI) as shown on the following sheet. The configuration of the SPUI will be two through lanes in each direction, dual lefts in each direction, and drop right turn lanes in each direction. The exit ramps will consist of dual lefts and a continuous right turn lane that becomes the outside lane north and south of the interchange.

The structure will be a "Bow Tie" structure with approximately 61,500 SF of deck supported by Bulb "T" Beams. It will remain a two span structure with a 58 ° +/- skew to span the future widening of I-285.

HSC2000 software indicates the signalized intersection portion of the interchange will operate at or near capacity in design year.

Insert 1

Insert 2

Insert 3

Insert 4

Insert 5

Insert 6

Insert 7

Insert 8

Insert 9

Insert 10

Insert 11

Insert 12

VALUE ENGINEERING ALTERNATIVE
INTERCHANGE CONFIGURATION
COST COMPARISON

DESCRIPTION	UNITS	UNIT COST	PROP'D QTY.	PROP'D COST	V.E. QTY.	V.E. COST
TIGHT DIAMOND (STEEL GIRDER STRUCTURE)	SF	$100.00	48050.0	$4,805,000	0.0	$0
SPUI (BULB "T" BEAM STRUCTURE)	SF	$70.00	0.0	$0	61500.0	$4,305,000
SIGNALS	EA	$60,000.00	2.0	$120,000	1.0	$60,000
SUBTOTAL				**$4,925,000**		**$4,365,000**
INFLATION (5%, 4YRS)			21.6%	$1,061,368	21.6%	$940,685
SUBTOTAL				**$5,986,368**		**$5,305,685**
E&C			10.0%	$492,500	10.0%	$436,500
GRAND TOTAL (2007)				**$6,478,868**		**$5,742,185**

POSSIBLE SAVINGS $736,684

VII.(G) DESIGN COMMENTS

DESIGN COMMENTS

1. The Panthersville Road Bridge is designed to be four spans as it crosses I-285 and the on/off ramps. Rather than bulb "T" beams, smaller AASHTO beams should be considered.

2. The staging of this project will be critical to the movement of traffic during the construction. One item to be considered is that the bridge on Flat Shoals Road should be open to all lanes before restricting Panthersville Road to one lane in each direction.

3. Long-range plans include the reconstruction of I-285 for improved capacity by adding HOV and through lanes. Since this future construction will again require widening the bridge over Shoal Creek, it is recommended that new structures be considered for the eastbound entrance ramp and westbound exit ramp. This would eliminate having to impact ramp traffic under future construction.

4. The intersection of Flat Shoals Road with Clifton Springs Road and Columbia Drive was described to be one of the primary problems with traffic flow on Flat Shoals Road even backing traffic onto I-285. A flyover structure for Clifton Springs/Columbia Drive should be considered to eliminate this problem.

VIII. SUMMARY OF RECOMMENDATIONS

SUMMARY OF RECOMMENDATIONS

It is the recommendation of the Value Engineering Team that the following Value Engineering Alternatives be carried into the Project Development process for further development.

RECOMMENDATION NUMBER 1- FLAT SHOALS ROAD BRIDGE

The Value Engineering Team recommends that Value Engineering Alternative No. 2, Option "B" be implemented. This alternative reduces the typical section on the bridge by eliminating both outside lanes on the bridge between the ramp terminals and uses bulb T beams.

If this recommendation can be implemented, there is a possible savings of **$ 2,291,317.**

If this recommendation cannot be implemented, then the Value Engineering Team recommends that Value Engineering Alternative No. 1 be implemented. This alternative eliminates the steel plate girders and uses concrete bulb T beams.

If this recommendation can be implemented, there is a possible savings of **$ 1,940,733.**

RECOMMENDATION NUMBER 2- PANTHERSVILLE ROAD BRIDGE

The Value Engineering Team recommends that Value Engineering Alternative No. 1 be Implemented. This alternative
uses a two span concrete bulb T beam bridge rather than a four span bulb T beam bridge.

If this recommendation can be implemented, there is a possible savings of **$ 2,798,667.**

RECOMMENDATION NUMBER 3- SHOAL CREEK BRIDGE WIDENING

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative eliminates the widening of the bridge on both sides of I-285.

If this recommendation can be implemented, there is a possible savings of **$ 963,635.**

RECOMMENDATION NUMBER 4- RETAINING WALLS

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative uses small block pre-cast walls for both the cut and fill Walls.

If this recommendation can be implemented, there is a possible savings of **$ 1,855,047.**

RECOMMENDATION NUMBER 5- INTERCHANGE RAMP PAVEMENT

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative uses asphalt pavement on the ramps rather than concrete.

If this recommendation can be implemented, there is a possible savings of **$ 1,698,261.**

RECOMMENDATION NUMBER 6- INTERCHANGE CONFIGURATION

The Value Engineering Team recommends that the Value Engineering Alternative be implemented. This alternative uses a single point urban interchange rather than a diamond interchange.

If this recommendation can be implemented, there is a possible savings of **$ 736,684.**